10/647,602

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,798,641 B1
DATED : September 28, 2004
INVENTOR(S) : Peter J. Hopper et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page illustrating a figure should be deleted, and substituted therefor title page illustrating a figure. (Attached)

Delete Fig 1, and substitute therefor Fig 1. (Attached)

Signed and Sealed this

Fifth Day of April, 2005

JON W. DUDAS
Director of the United States Patent and Trademark Office

10/647602

(12) **United States Patent**
Hopper et al.

(10) **Patent No.: US 6,798,641 B1**
(45) **Date of Patent: Sep. 28, 2004**

(54) **LOW COST, HIGH DENSITY DIFFUSION DIODE-CAPACITOR**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/647,602**

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(51) **Int. Cl.**[7] **H01G 4/228**

(52) **U.S. Cl.** **361/306.1**; 361/306.3; 361/321.1; 361/321.4; 361/311; 361/313; 361/303

(58) **Field of Search** 361/306.1, 306.3, 361/321.1, 321.4, 303, 305, 311, 313, 301.2; 438/253, 254, 397, 398; 257/306, 355, 359, 362

(56) **References Cited**

U.S. PATENT DOCUMENTS

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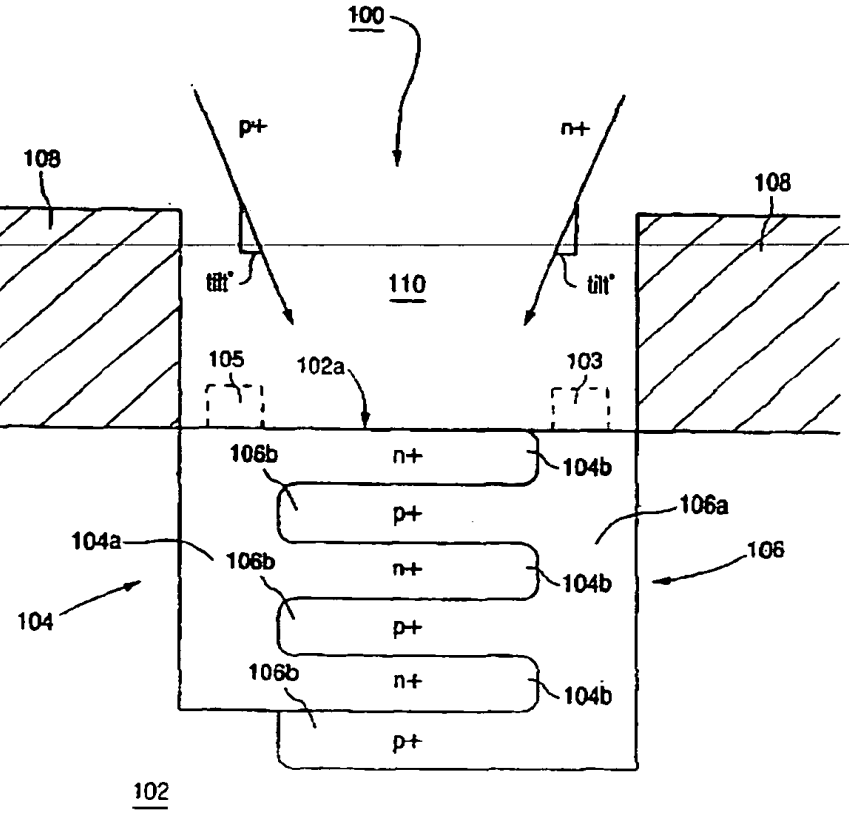
(57) **ABSTRACT**

A multiple-layer diffusion junction capacitor structure includes multiple layers of inter-digitated P-type dopant and N-type dopant formed in a semiconductor substrate. An opening in a hard mask is formed taking care to control the angle of the sidewall using a dry, anisotropic etching process. P-type and N-type dopant are then implanted at positive and negative shallow angles, respectively, each with a different energy and dose. By utilizing the properly determined implant angles, implant energies and implant doses for each of the dopant types, a high capacitance and high density diode junction capacitor, with inter-digitated N-type and P-type regions in the vertical direction is provided.

6 Claims, 1 Drawing Sheet



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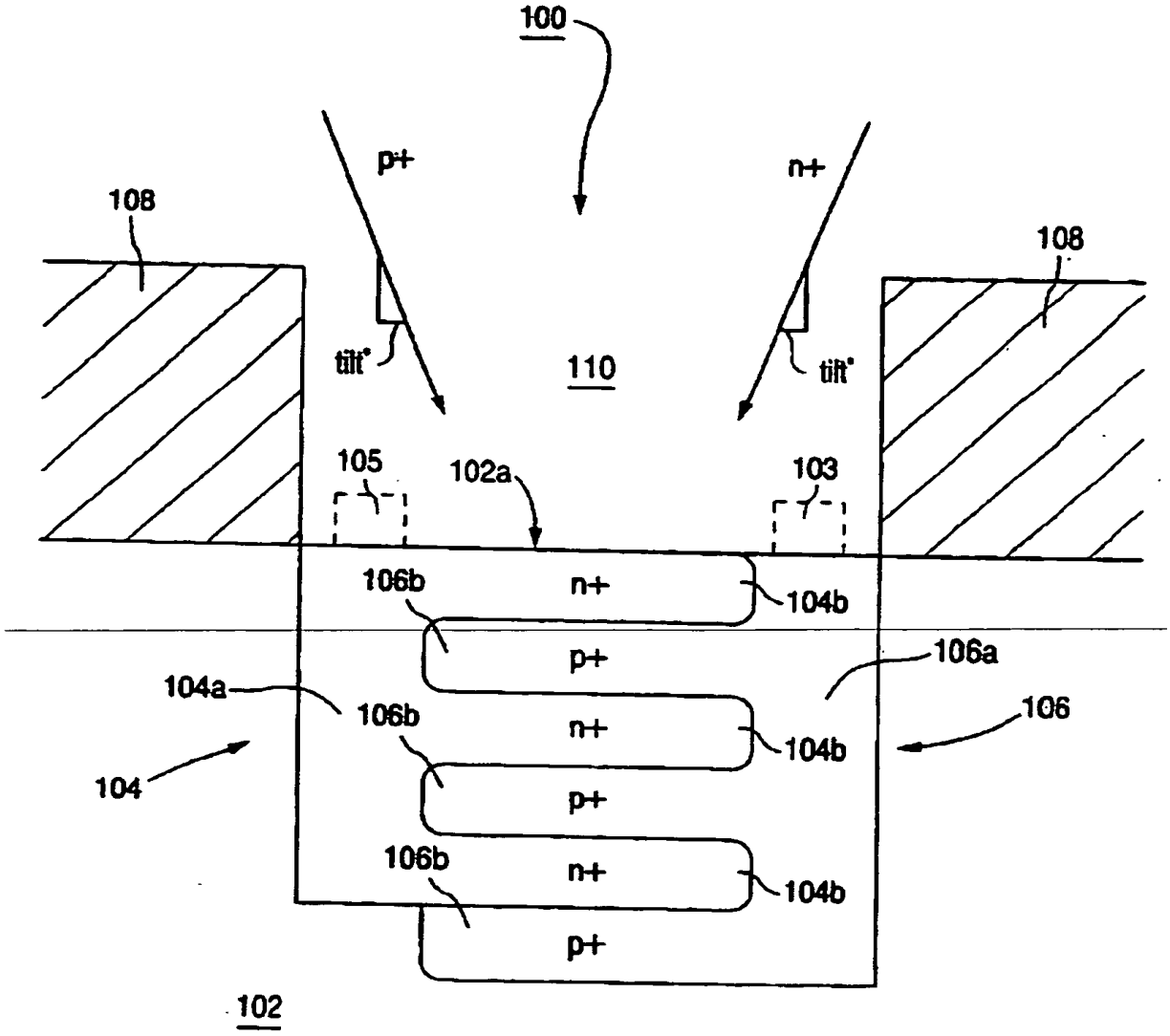

FIG. 1